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(43) Date application laid open to the public: April 19, 1996, Bulletin 96/16.	(72) Inventor(s): RICCI LAMI GILLES ANDRE and MONTORI ROBERT.
(56) List of documents cited in preliminary search report: <i>See end of this reprint.</i>	(73) Proprietor(s):
(60) References to other related national documents:	(74) Agent(s): CABINET HERRBURGER.

(54) VIDEO AND AUDIO COMMUNICATION NETWORK

(57) a) A communication network with video, audio and data distribution, comprising a set of sources (S1-Sn) accessible to a set of users (U1 ... Um) who can themselves become sources,

b) said network being characterized by a selection and management system (E) comprising:

- transmission cards (CE1 - CEi - Cen) linked to the sources (S1-Sn); user cards (CU1 - Cuj - Cum);
- a switching means (GC) for linking a source (Si) to a user (Uj);
- a managing element (G1);
- a network (C1-Cj-Cm) linking the system (E) to each user (U1-Uj-Um);
- a user module.

## Video and Audio Communication Network

The present invention concerns a communication network with video, audio and data distribution, comprising:

- a set of sources accessible to a set of users who can themselves become sources.

The prior art includes in particular a communication network composed of a bus into which the various modules of the network are tied.

Management is provided by a management station connected to the modules of the network by star-type link lines. This station therefore manages the exchanges between modules.

As a result of this architecture, each module receives the data intended for it, but must equalize the signals as they arrive, since the transmitting module transmits the signals just as they are, with no allowance for their destination, i.e., the transmission distance.

Moreover, such networks are relatively complicated to install, since there must be not only a bus to connect the various modules accessing the network, but also a star-type link to connect the modules to the central management station.

It is an object of the present invention to remedy such drawbacks by creating a communication network that utilizes very simple wiring and permits decentralized management.

To this end, the invention concerns a network of the aforesaid type, characterized in that it comprises:

A - a selection and management system comprising:

- a switching means for linking a given source to a given user;
- transmission cards linked to the sources;
- user cards linked to the users and comprising a system for preemphasizing the signals according to the distance between the user card and the user;
- a managing element linked to the switching means.

B - a network linking the selection and management system E to each user;

- said network being formed by a single cable having plural pairs.

C - a user module for each user of the network, to place the user and the user card in communication;

the user consisting of display and/or recording means,  
the user module comprising a programmed microprocessor to manage the signal exchanges between the source (Si) and the user.

The network according to the invention permits star-type cabling with bus-type extension, while at the same time comprising decentralized management at the level of each user terminal.

Each user can select his<sup>1</sup> source or series of sources, whether they be video sources received by radio, satellite, cable or fiberoptic transmission, or local sources for video signals conforming to various standards (SECAM, PAL, NTSC, D2MAC or MPEG digital, etc.).

The network has the advantage of being very simple to install or of being able to use pre-existing star wiring, since only two pairs are needed to transmit the signals to the user station. The management is specific to each terminal. The terminal sends the user card a reference signal to use in preemphasizing the signal.

If two other pairs in the cable are used, signals generated by a device linked to a user terminal can be sent back to the switching system in order to reinject the signal into the network (as any desired source), rerecord the signal, or transmit it directly.

The invention advantageously makes it possible for a large number of sources (for example, 80 sources or more) to be made available simultaneously.

Delocalized management at each terminal ensures reliability of operation and eliminates the need for centralized management, since each terminal has its own operating configuration and retains this configuration when moved about the network. A user can therefore relocate to anywhere in the cabling system and still keep his access rights by simply moving the box.

According to a variant, the terminal is equipped with a chip card that enables the user to relocate to anywhere in the cabling system while keeping his rights, without disconnecting or moving the terminal, but simply by using the chip card containing his own configuration.

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<sup>1</sup>TRANSLATOR'S NOTE: The French possessive adjective "ses" (son, sa) has the advantage of meaning "his," "her" or "its." It is true that the user has been defined for the purposes of the invention as "display or recording means" (see previous page). However, many references to the user later in the patent seem to indicate a person rather than a thing (e.g., "even when the user has shut down terminal Tj" [p. 8 of this translation]). We have therefore used "his" rather than "its."

The advantages of delocalized management are completed by the feasibility of installing in the invention a centralized management system that permits various more advanced functionalities, including remote configuration of terminals, forcing of terminals, collation of statistics, and activation and deactivation of user terminals, all in the whole or a part of the network. It is possible to control access to the sources and/or to manage their accounting aspect, i.e., payment for the service provided by the network.

According to another variant, information can be overlaid on the screen of a television receiver connected to the terminal, for example messages from the centralized management system.

According to a variant, the terminal is equipped with a chip card permitting the control of access to, management of and payment for extra services provided by the network.

According to another advantage of decentralized management, there can be not only fixed sources, but also controlled sources such as videocassette recorders, videodisk players, video cameras, etc. The terminal, which is transparent to the control signals for these controlled sources, can be used to control them remotely. From his terminal, each user can select a source not only with respect to its audio/video signals, but also with regard to remote control. This variant is obtained by the addition of an extra switching matrix mounted in parallel with the audio/video switching matrix.

Finally, the network does not preclude the existence, alongside the decentrally managed user terminals, of receivers that are controlled directly by the selection and management system, i.e., that do not possess local decision-making autonomy. This might, for example, be an untended television set placed in a location such as a passageway.

The invention will be described hereinbelow with reference to a schematic exemplary embodiment of a network depicted in the drawings, wherein:

- Fig. 1 is an overall diagram of the communication network according to the invention,
- Fig. 2 is a simplified representation of the structure of a user terminal.

As shown in Fig. 1, the invention concerns an information distribution network, especially for video and/or audio information and/or data, with decentralized management, selectively linking a set of information sources to users who can themselves become information sources. The various users are connected to the network by star-type link lines using single, multipair

cables, and each user manages his access to the various sources.

In greater detail, the network includes a set of information sources  $S_1, S_2, \dots S_i, \dots S_n$ , which can be not only video and/or audio sources, but also sources of written information (teletext), etc.

Sources  $S_1-S_n$  are linked to a selection system  $E$  comprising transmission cards, ( $CE_1-CE_i-CE_n$ ) forming the inputs associated with the various sources ( $S_1-S_i-S_n$ ), and user cards ( $CU_1-CU_j-CU_m$ ). The transmission cards and the user cards are linked by a switching matrix ( $GC$ ) controlled by each user terminal. When so requested, the switching matrix ( $GC$ ) places the source ( $S_i$ ) in communication with the user or users ( $U_j$ ) via the user cards ( $CU_1-CU_j-CU_m$ ) and the user terminals ( $T_1-T_j-T_m$ ), for which the line lead-ins ( $AL_1-AL_j-AL_m$ ) have been shown.

System  $E$  is connected to the users by a star-type network formed of cables ( $C_1 \dots C_j \dots C_m$ ) linking each user card ( $CU_j$ ) to a user terminal ( $T_j$ ). The user terminal ( $T_j$ ) is a data distribution and entry means at the user level. It includes a line access device ( $Al_j$ ) connected to the cable ( $C_j$ ) for receiving data transiting the system ( $E$ ).

In return, the terminal ( $T_j$ ) can control sources connected to the system ( $E$ ), such as a bank of videocassette recorders, for example. Such videocassette recorders, or any other infrared-controllable machine, are connected (for the purposes of the infrared) to a set of cards ( $TIR$ ). The purpose of this set of cards is to recondition the infrared signals from the various user terminals in order to send them to an infrared transmitter ( $EIR_k$ ) and thence to each machine to be controlled ( $MT_k$ ). The user terminals and these cards ( $TIR$ ) are linked together by an infrared switching matrix ( $GIR$ ). When so requested, the switching matrix ( $GIR$ ) places the rotating machine ( $MT_1$ ) ...<sup>2</sup> the user or users ( $U_j$ ) via the user cards ( $CU_1, CU_j, CU_m$ ) and the user terminals ( $T_1, T_j, T_m$ ).

In general, the description of the invention given in reference to Fig. 1 is of a network whose various sets of elements, such as the sources, transmission cards, user cards, user terminals, etc., are described via their representative element, such as source  $S_i$ , its transmission card  $C_{ei}$ , user card  $C_{uj}$ , user terminal  $T_j$  and user  $U_j$ . This description automatically translates

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<sup>2</sup>TRANSLATOR'S NOTE: Phrase apparently omitted from the original; "in communication with" would be our assumption.

to the other elements in the set.

Thus, in greater detail, source Si represents the various programs transmitted by radio link, satellite and cable, corresponding to the various signal standards or signal types SECAM, PAL, NTSC, D2MAC, videodisk players, rotating machines in general, cameras, video master controls, teletext sources, compressed digital images.

The signals emitted by source Si are conditioned by transmission card CEi for delivery to switching matrix GC, which makes them available to user Uj via the user card and its terminal Tj.

The user terminal (Tj) is the part of the installation that is accessible to the user (Uj). It includes various connecting, input and output means for a user that enable the user to tie into a chosen source and to transmit data to downstream video and audio display means and back-retransmission means from sources dependent on said user.

Terminal Tj will be described hereinafter in a general manner on the basis of Fig. 2, without assigning the index "j" to the various parts of the most complete terminal Tj according to the invention, in view of the fact that the terminal can be simplified as required for particular needs.

According to Fig. 2, terminal Tj comprises:

- a mains feed (S1),
- a line access device (AL),
- a connector (P1) for a display terminal (TV),
- an auxiliary connector 1 (A1),
- an auxiliary connector 2 (A1),
- an auxiliary connector 3 (A1),
- a mains connector (S2),
- an infrared input (EIR),
- a chip-card or magnetic-card or optical-card reader (EC),
- an electrical remote-control input/output (TC),
- a speaker output (HP),
- an overlay card (OSD),
- a set of displays (AF).

This terminal is managed by a microprocessor (CPU).

In a more detailed manner:

The line access device (AL) is used to tie into the cable (Cj) connected to the selection and management system (E) in order to select and receive the sources (S1-Sn).

Connector P1 is used to supply power to a display terminal. This device can be a television set, a monitor, a video projector, a microcomputer overlay card or any other display means.

Auxiliary connector A1 makes it possible to use terminal Tj in a transparent manner, by connecting, for example, a local videocassette recorder so that it can be distributed to local display terminal TV connected to connector P1. This auxiliary connector is equipped for input and output; it also can be used to record the program displayed on the display terminal of the user terminal or to inject the signal from this videocassette recorder back into system E for redistribution to the so-called "user" set or for any other use at the level of system E. The input/output functionality of this connector also makes it possible to use local decoders that make it possible to distribute in the network coded programs that are decoded solely at the user-terminal level; this decoding functionality can be associated with a videocassette recorder in accordance with the transparency procedures already being used for CANAL +, inter alia.

The second auxiliary connector (A2), configured for input only, is used to connect a local video and audio source for retransmission back to system E and redistribution to the so-called "user" set, or for any other use at the level of system E.

The third auxiliary connector (A3), in common with connector TC, is designed to receive or transmit "1" or "0" type data to or from external events such as the closing of a contact<sup>3</sup> or a device command. This connector also has access from the outside to the internal bus of terminal Tj.

Mains feed S1 is used to connect terminal Tj to the electric power supply.

Mains connector S2 is a controlled power connector serving the purpose of controlled connection of a device such a television set, a videocassette recorder or a video camera. This

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<sup>3</sup>TRANSLATOR'S NOTE: The French actually says "contract" (*contrat*), which we assume to be a typographical error. (The word "contact" is the same in both languages.)

connector can be used, for example, to turn on a television set or a display terminal in a controlled manner by means of the remote control of the user terminal (Tj), without recourse to the television set's remote control. The user terminal can also use its built-in clock to control this connector at set times. If the installation is provided with a centralized system and is composed of plural users, this connector can be controlled by this centralized management system, making it possible to control the connector at the television sets (TV) linked to user terminal Tj, either in the aggregate, in sets, or in subsets.

The infrared input (EIR) makes it possible to control terminal Tj, to select various modes of operation of the terminal, to select sources, for example coming from line access device AL, auxiliary connector 1 (A1) or the audio channel, and [to perform] any other conventional or future control of such a terminal. Via the terminal, this connector (EIR) also ensures transparency of the infrared signals intended for rotating machines (MTk) centralized at the level of E, thus permitting the remote control of these machines via the infrared switching matrix (GIR), the infrared remote-control card (TIR) and the infrared transmitter (EIRk).

The card reader (EC) can be used to configure terminal Tj, to authorize terminal Tj to access sources S1, Sn on the basis of certain criteria, or to manage the accounting aspect of the use of the sources or of any other equipment connected to the centralized management system.

The set of displays (AF) enables the CPU to inform the user of the current status of the terminal, for example inactive mode with time display or active mode with display of the channel selected or of the function currently being activated.

The overlay card (OSD) serves to continuously or temporarily display messages from the terminal or from the centralized system. This card has a high storage capacity, enabling it to store data intended for the user even when the user has shut down terminal Tj. When the terminal is powered up, for example a signal appears on the terminal's built-in display (AF) informing the user that a message is present<sup>4</sup>. This card can also makes it possible to issue questionnaires (the multiple-choice type, for example) for use by the centralized management system, and to which the user responds by means of his infrared remote control.

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<sup>4</sup>TRANSLATOR'S NOTE: Our inference. The French actually says "permitting the user the existence of a message."



The electric remote-control input/output (TC) is used for remote control of the terminal by means of any desired electrical device, such as a microcomputer, for example, and transmission of data back to the microcomputer.

Output HP serves to supply power to either a pair of acoustical enclosures or an amplifier, to permit either the distribution of audio signals accompanying the video signal or the use of a display terminal or radio-type audio-signal terminal or any other musical source, as well as the transmission of command calls.

Terminal Tj, managed by the microprocessor (CPU), can perform level correction, i.e., additional equalization on the arrival of the signal from the system E, which has already preemphasized the signal by measuring the reference level transmitted by terminal Tj, thus providing continuous knowledge of the distance between terminal Tj and user card Cuj regardless of the cabling or recabling of the cable system (Cj).

The link between the selection and management system (E) and the user terminals (Tj) is established with ordinary multipair cable. This connection utilizes two pairs of one cable, and the other two pairs can serve as a return path to deliver signals from this terminal (Tj) or its environment to the system (E).

## CLAIMS

- 1) A communication network with video, audio and data distribution, comprising:
- a set of sources (S1-Sn) accessible to a set of users (U1 .. Um) who can themselves become sources,
- said network being characterized in that it comprises:
- A - a selection and management system (E) comprising:
    - transmission cards (CE1 - CEi - Cen) linked to the sources (S1-Sn);
    - user cards (CU1 - Cuj - Cum) linked to the users (U1 - Uj - Um);
    - a switching means (GC) for linking a given source (Si) to a given user (Uj);
    - a managing element (G1) linked to said switching means (GC);
  - B - a network (C1-Cj-Cm) linking said selection and management system (E) to each user (U1-Uj-Um);
    - said network being formed by a single cable (C1-Cj-CM) having plural pairs.
  - C - a user module (T1-Tj-Tm) for each user of the network, to place said user (Uj) and said user card (CUj) in communication, said user consisting of display and/or recording means, said user module (Tj) comprising a programmed microprocessor (CPU) to manage the signal exchanges between said source (Si) and said user (Uj) and to equalize the signals received from said source.

2) A network as recited in claim 1), characterized in that said user terminal (Tj) comprises a line input (AL) for tying into a cable (C1-Cm) connected to said selection and management system (E), a connector (P1) for a display and/or recording device (AF), auxiliary connectors (A1, A2) for tying in other display and/or recording devices, a controlled mains connector (S1) for the controlled supply of power to a device, an infrared input (EIR) for infrared remote control, a card reader (EC) of optical or magnetic or chip cards, and a microprocessor (CPU) for controlling and managing said terminal (Tj).

3) A network as recited in claim 1), characterized in that said selection and management system, said transmission cards (CEi), said user cards (Cej), the communication means (Gc) and said user terminals (Tj) permit the transmission, selection and distribution simultaneously with the video signal of a set of audio signals comprising plural audio channels, for example 6 or 8 or more, without modification of the cabling and the use [syntax sic] of only two of the aforesaid pairs.

4) A network as recited in claim 3), characterized in that said selection and management system, said transmission cards (Cei), said user cards (Cej), said communication means (Gc) and said user terminals (Tj) can be used to transmit compressed digital signals.

## FRENCH REPUBLIC

National Institute of  
Intellectual Property

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## PRELIMINARY SEARCH REPORT

established on the basis of the last claim  
filed before the search was started

National Application No.

FA 505762

FR 9412242

## Relevant Documents

Category	Identification of Documents with specification, where required of critical parts	Re Claim
A	WO-A-93 06692 (BELL ATLANTIC NETWORK SERVICES) *Page 1, line 1 - line 7; Claims 1, 14, 21, 32, 39, 50; Figures 2, 8*	1
A	DE-A-34 16 036 (STANDARD ELEKTRIK LORENZ SEL AG) * Page 4, line 1 - line 22 * * Page 5, line 10 - page 6, line 10; Claims 1, 2, 5; Figures 1-3 *	1
A	EP-A-0 208 501 (AMERICAN TELEPHONE & TELEGRAPH COMPANY) * Page 1, line 1 - page 3, line 21; Claims 1, 7; Figures 1, 2 5 *	1
A	EP-A-0 319 356 (VISICABLE +) * Column 1, line 1 - column 3, line 51; Claims 1, 3-5; Figures 3, 11 *	1

Searched Fields  
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Search completed  
20 June 1995Examiner  
De Haan, A.J.

## Category of cited documents

A Relevant in opposition to at least one claims  
or background technology